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Invention: A TRANSFER UNIT FOR CONTAINERS

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This is a:

- ☐ Provisional Application
- ☒ Regular Utility Application
- ☐ Continuing Application
  ____ The contents of the parent are incorporated by reference
- ☐ PCT National Phase Application
- ☐ Design Application
- ☐ Reissue Application
- ☐ Plant Application

This application claims priority to Italy Patent Application No. BO 2002A 000632, filed October 8, 2002 which is incorporated by reference herein.

SPECIFICATION

A TRANSFER UNIT FOR CONTAINERS

BACKGROUND OF THE INVENTION

The present invention relates to a transfer unit for containers.

More exactly, the present invention is applicable advantageously to machines for filling and capping containers generally considered, and in particular, bottles taken up from a first conveyor coinciding for example with the outfeed of a filler or capper, and transferred to a second conveyor on which they advance toward a downstream machine, for instance a labeler.

In prior art systems, bottles leaving the first conveyor will be restrained generally by the neck, whilst the second conveyor operates at a height dictated by the downstream machine and presents an entry portion adjustable for height in such a way as to accommodate variations in the longitudinal dimension of different bottles.

This means in practice that the entry portion of

the second conveyor is inclined in the manner of a chute, and in certain cases the resulting angle may be unacceptably steep, so that the bottles cannot be conveyed properly or remain balanced.

The object of the present invention is to provide a transfer unit that will overcome the drawback in question by ensuring bottles are directed correctly and safely onto the second conveyor.

SUMMARY OF THE INVENTION

The stated object is realized in a transfer unit for containers according to the present invention.

The unit disclosed comprises means by which to grip and hold single containers take up from a first conveyor operating at a first height, and feed means by which the gripping means are advanced along a predetermined transfer path extending between the first conveyor and a second conveyor operating at a second height.

Also forming part of the unit are means by which to bring about a controlled variation in the height of the gripping means during their passage along the predetermined transfer path.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in detail, by

way of example, with the aid of the accompanying drawings, in which:

-figure 1 shows a portion of a bottling line for containers, comprising a transfer unit according to the present invention, illustrated in a schematic plan view

-figure 2 shows the unit of figure 1 in a schematic elevation view, with parts illustrated in section;

-figure 3 is an enlarged detail of figure 2;

-figure 4 shows a detail of figure 2, illustrated in perspective;

-figure 5 is an enlarged detail of figure 1, from which certain parts are omitted;

-figures 6 and 7 are plan views showing a detail of figure 1 in two different operating configurations.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to figure 1 of the accompanying drawings, 1 denotes a portion of a bottling line for filling containers 2, each presenting a body 3 and a neck 4 (figures 2 and 3).

The line 1 comprises a transfer unit 5 rotatable about a vertical axis 6, turning counterclockwise as seen in figure 1, through a receiving station 7 at which the selfsame unit takes up a succession of containers 2 from a first rotary conveyor 8 turning

clockwise about at axis (not illustrated) disposed parallel to the main axis 6.

The function of the unit 5 is to transfer the containers 2 to a release station 9 coinciding with a second linear conveyor 10 advancing substantially tangential to the unit 5 in a direction denoted F1, by which the containers 2 are carried toward a further station (not illustrated) of the bottling line 1.

The transfer unit 5 comprises a vertical shaft 11 extending upward from a bed 12 concentrically with the main axis 6. The shaft 11 carries a flange 13 at the free top end, also a disc element 14 mounted to the flange and furnished around the periphery with a plurality of angularly equispaced pairs 15 of vertical guide elements 16 aligned on respective axes parallel to the main axis 6, of which the free ends are directed toward the bed 12. The flange 13, the disc 14 and the guide elements 16 combine to establish a moving frame 17 and together constitute feed means 18 by which the containers 2 are carried along a path 19 consisting in a closed loop and including a transfer path 19a that extends from the receiving station 7 to the release station 9.

Associated with each pair 15 of guide elements 16 are vertically slidable means 20 that comprise a

slide 21 carrying means 22 by which to hold and support a single container 2. More exactly, the top face 23 of the slide 21 presents a pair of vertical pivots 24 (figures 1 and 5) serving to support and enable the angular movement of a pair of jaws 25 and 26 functioning as means 27 by which to grip the neck 3 of a single container 2.

As discernible in figures 2 and 3, the transfer unit 5 further comprises means 28 by which to vary the height of the jaws in such a way as will render them capable of movement, more exactly, between a first higher level at which the containers 2 are taken up at the receiving station 7, and a second lower level at which the containers 2 are deposited at the releasing station 9.

The aforementioned height variation means 28 include means 29 by which to guide the movement of the slides 21, consisting in a tubular element 30 that presents a C-shaped cross-sectional profile and a longitudinal opening 30a and is centered on the vertical shaft 11. The bottom part of this same tubular element 30 is furnished with respective quick coupling and fastening means 31 operating in conjunction with fastening means 32 afforded by a sleeve 33 secured to the bed 12 coaxially with the shaft 11, which comprise a circular plate 34 and a

ring 35 with radial lugs 36 positioned above the plate (figures 6 and 7).

The guide means 29 also comprise a sector 37, coinciding with an arc to a circle centered on the shaft 11, which is positioned with the concave side directed toward the opening 30a and mounted rigidly to the bed 12 in a manner not illustrated.

More exactly, the aforementioned guide means 29 comprise respective cam profile means 38 composed of a first track 39 extending around the outer cylindrical surface 40 of the tubular element 30, and a second track 41 afforded by the top surface of the circular sector 37. The two tracks 39 and 41 are substantially complementary one to another, and present a combined length enabling them to extend around the full 360° compass of the looped path 19 aforementioned, including the transfer path 19a along which the holding and supporting means 22 are caused to advance.

As discernible in figures 2 and 3, each slide 21 comprises relative engagement means 43 interacting with the first and second tracks 39 and 41.

More precisely, the engagement means 43 comprise a first roller 44 mounted freely to the end of a radial pivot 45 projecting from the slide 21 toward the cylindrical surface 40 of the C-shaped tubular

element 30, and a second roller 36 mounted freely to a pivot 47 disposed parallel to the pivot 45 first mentioned and carried by an arm 48 extending downward from the slide 21. The first roller 44 is insertable into the first track 39, whilst the second roller 46 runs on the second track 41.

In operation, containers 2 are taken up singly and in succession from the first conveyor 8 at the receiving station 7 by the holding and supporting means 22, positioned at the aforementioned first height. During the course of the passage onto the transfer unit 5, the container 2 is subjected to a radial pushing force that has the effect of opening the jaws 25 and 26 and causing the neck to locate in a seat 49 afforded by the rounded ends of the selfsame jaws 25 and 26, against the resilient action of a spring 50.

In the course of the take-up step, during which the holding and supporting means 22 are positioned at a height substantially level with the neck 4 of a container 2 standing on the first conveyor 8, the slide 21 is supported by the second roller 46 as it runs on the surface 42 of the sector 37, advancing along the transfer path 19a to the point at which the first roller 44 engages with the first track 39 of the tubular element 30.

With the transfer unit 5 then continuing to turn about the center axis 6, the height of the slide 21 will change as the first roller 44 advances along the profile of the corresponding track 39.

As illustrated in figure 4, the cam profile of the first track 39 presents a first substantially straight portion 39a engaged by the first roller 44 with the second roller 46 still advancing along the relative track 41, followed by a first descending inclined portion 39b engaged by the first roller 44 after the second roller 46 has separated from the surface 42 of the sector 37, and next in sequence, a substantially horizontal portion 39c along which the holding and supporting means 22 are positioned at a height substantially level with the neck 4 of a container 2 standing on the second conveyor 10.

The transfer unit 1 further comprises actuating means 51 by which to produce the opening movement of the holding and supporting means 22, consisting in a cam sector 52 fixed to the outer cylindrical surface 40 of the tubular element 30 and designed to interact with a following roller 53 carried by the end of an arm 54 associated with one jaw 26.

The profile of the cam sector 52 is such as to engage the following roller 53 and cause the jaw 26 in question to rotate about the relative pivot 24.

The jaw 26 in turn presents a tooth profile 55 by which the other jaw 25 is caused to rotate about the relative pivot 24 in the opposite direction.

Following the step by which the container 2 is released to the second conveyor 10, the holding and supporting means 22 continue to advance along the circular path 19, the following roller 53 separates from the cam sector 52 and the jaws 25 and 26 are drawn together by the spring 50.

Passing beyond the horizontal portion 39c of the track 39, the first roller 44 passes onto a second ascending inclined portion 39d and the slide 21 is caused to return upwards along the respective guide elements 16, bringing the holding and supporting means 22 up to a height level with the neck 4 of a container 2 advancing on the first conveyor 8.

During this same step, the first roller 44 passes along a third and final straight portion 39e of the first track 39, whilst the second roller 46 regains the sector 37 and begins to advance along the first part of the top surface 42.

Importantly, the transfer unit 5 according to the present invention presents the advantage of being readily adaptable to any size of container 2, since it allows a rapid replacement of the cylindrical tubular element 30 and sector 37. After an initial

twisting movement serving to release it from the fastening means 32 rigidly associated with the shaft 11, the tubular element 30 can be removed with ease, thanks in particular to the C-shaped geometry described and illustrated, by inducing a sideways movement transverse to the axis 6 of the shaft 11.

Accordingly, to fit a new tubular element 30 with a first track 39 of different profile, the element is first translated radially into a position of coaxial alignment with the shaft 11. Thereafter, the tubular element 30 is shifted axially in such a manner that the internally projecting lugs 56 of a C-shaped sector 57 presented by the bottom of the tubular element 30 are caused to locate between the radial lugs 36 mentioned previously and register against the plate 34, thereby assuming the position illustrated in figure 6.

Finally, a twisting movement left or right will cause the lugs 56 to lodge between the plate 34 and the ring 35, thereby locking the tubular element 30 to the shaft 11 as illustrated in figures 2 and 7. Any risk of the element twisting loose accidentally will be prevented by retaining means, illustrated as spring-loaded plungers 58 disallowing relative movement between the plate 34 and the lugs 56.